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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary

Application No.

10/584,010

Applicant(s)

LI ET AL.

Examiner

ALEXANDRIA Y. BROMELL

Art Unit

2167

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 26 September 2008.
2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-13 is/are pending in the application.
4a) Of the above claim(s) _____ is/are withdrawn from consideration.
5) ☐ Claim(s) _____ is/are allowed.
6) ☒ Claim(s) 1-13 is/are rejected.
7) ☐ Claim(s) _____ is/are objected to.
8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
10) ☒ The drawing(s) filed on 21 June 2006 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-8508)
Paper No(s)/Mail Date _____
4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date _____
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____

DETAILED ACTION

Response to Arguments

Applicant's arguments filed September 26, 2008 have been fully considered but they are not persuasive.

Applicants argue that a prima facie case of obviousness has not been established because none of the cited references alone or in combination teach all the amended claim limitations (remarks, page 10).

Examiner respectfully disagrees all of the allegations as argued. Examiner, in her previous office action, gave a detailed explanation of the claimed limitations and pointed out exact locations in the cited prior art. All claim limitations are taught by Petersen, Sheppard, Pinkham, or the combination of them.

Examiner is entitled to give claim limitations their broadest reasonable interpretation in light of the specification. See MPEP 2111 [R-1].

Interpretation of Claims-Broadest Reasonable Interpretation

During patent examination, the pending claims must be 'given the broadest reasonable interpretation consistent with the specification.' Applicant always has the opportunity to amend the claims during prosecution and broad interpretation by the examiner reduces the possibility that the claim, once issued, will be interpreted more broadly than is justified. In re Prater, 162 USPQ 541,550-51 (CCPA 1969).

In response to applicant's argument on page 10, a prima facie case of obviousness is established when the teachings from the prior art itself would appear to

have suggested the claimed subject matter to a person of ordinary skill in the art. Once such a case is established, it is incumbent upon appellant to go forward with objective evidence of unobviousness. In re Fielder, 471 F.2d 640, 176 USPQ 300 (CCPA 1973).

Examiner further recognizes that obviousness can only be established by combining or modifying the teachings of the prior art to produce the claimed invention where there is some teaching, suggestion, or motivation to do so found either in the references themselves or in the knowledge generally available to one of ordinary skill in the art. See *In re Fine*, 837 F.2d 1071, 5 USPQ2d 1596 (Fed. Cir. 1988) and *In re Jones*, 958 F.2d 347, 21 USPQ2d 1941 (Fed. Cir. 1992).

One of ordinary skill in the art would be motivated to combine Antoshenkov with the teachings of Noven in order to use binary search for look up requests (Noven, column 6, lines 1-5). The motivation for doing so would have been to use a search algorithm that will help to create efficient database search (Noven, column 5, lines 29-49). There is a reasonable expectation of success.

One of ordinary skill in the art would be motivated to combine Antoshenkov with the teachings of Schmuck in order to manipulate files and directories within the directory structure, (Schmuck, column 3, lines 51-56). The motivation for doing so would have been to use indexing and file access methods to speed up lookups (Schmuck, column 6, lines 21-32). There is a reasonable expectation of success.

Applicant argues that the cited references do not teach "setting a directory structure composed of a group of record deviations at the end of a data page" (remarks, page 5), that "a record deviation is a position deviation of a certain record on the data

page" (remarks, page 6), that "each directory in the directory structure is called dir_slot, and each dir_slot stores the position deviation of one record" (remarks, page 6), that "searching for relative records in the dir_slot by adopting a locating algorithm" (remarks, page 7), and that "after locating one certain dir_slot, searching the relative group of records in order according to the record deviation stored in the dir_slot and locating the record to be searched for accuracy, and outputting the deviation of the record" (remarks, page 7).

Examiner respectfully submits that Antoshenkov teaches of a directory structure where information is stored in headers, including record pointers, that the file (record) pointers specify an absolute physical address where the directory or file resides, and that the root directory structure stores pointers of the children directories (column 9, lines 19 - 36). It is not required that the cited reference maintain the same naming as used in the instant application. Antoshenkov teaches that directories may be searched using subroutines (column 5, lines 57 – 62, and column 13, lines 62 - 62), and that after a directory is searched, and the directory entries are searched, a pointer to a matching file is returned (column 13, line 61 – column 14, line 15).

Applicant argues that dependent claims 2 – 13 are allowable for at least the same reasons as independent claim 1 (remarks, page 10).

Applicant's arguments fail to comply with 37 CFR 1.111(b) because they amount to a general allegation that the claims define a patentable invention without specifically pointing out how the language of the claims patentably distinguishes them from the references.

Claim Rejections - 35 USC § 101

35 U.S.C. 101 reads as follows:

Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

Claims 1- 13 are rejected under 35 U.S.C. 101 because the claimed invention is directed to non-statutory subject matter.

Claims 1- 13 are rejected under 35 USC 101 for being "software per se".

The claimed invention as in claims 1- 13 is addressed to "a method for fast locating records on a data page in a database" that can be interpreted as referring to lines of programming within a computer system, rather than referring to the system as a physical object. The claimed invention is directed to, "a database", therefore, the claims are deemed to read as pure software systems, with no clear limitations that read on some sort of hardware.

In view of Applicant's disclosure, specification paragraphs [0003], the present invention may be embodied in software. Accordingly, the claim may become nothing more than a set of software instructions which are "software per se".

"Software per se" is non-statutory under 35 USC 101 because it is merely a set instruction without any defined tangible output or tangible result being produced. The requirement for tangible result under 35 USC 101 is defined in *State Street Bank & Trust Co. v. Signature Financial Group Inc.*, 149 F.3d 1368, 47USPQ2d 1596 (Fed. Cir. 1998).

According to MPEP 2106:

The claims lack the necessary physical articles or objects to constitute a machine or a manufacture within the meaning of 35 USC 101. They are clearly not a series of steps or acts to be a process nor are they a combination of chemical compounds to be a composition of matter. As such, they fail to fall within a statutory category. They are, at best, functional descriptive material per se.

Descriptive material can be characterized as either "functional descriptive material" or "nonfunctional descriptive material." Both types of "descriptive material" are nonstatutory when claimed as descriptive material per se, 33 F.3d at 1360, 31 USPQ2d at 1759. When functional descriptive material is recorded on some computer-readable medium, it becomes structurally and functionally interrelated to the medium and will be statutory in most cases since use of technology permits the function of the descriptive material to be realized. Compare *In re Lowry*, 32 F.3d 1579, 1583-84, 32 USPQ2d 1031, 1035 (Fed. Cir. 1994).

Merely claiming nonfunctional descriptive material, i.e., abstract ideas, stored on a computer-readable medium, in a computer, or on an electromagnetic carrier signal, does not make it statutory. See *Diehr*, 450 U.S. at 185-86, 209 USPQ at 8 (noting that the claims for an algorithm in *Benson* were unpatentable as abstract ideas because "[t]he sole practical application of the algorithm was in connection with the programming of a general purpose computer.").

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1 is rejected under 35 U.S.C. 102(b) as being anticipated by Antoshenkov (US Patent 5379422).

With respect to claim 1, Antoshenkov teaches setting a directory structure composed of a group of record deviations at the end of a data page (i.e. a directory structure, or root directory, includes entries for deviations (pointers) to groups of children directories with records (files), column 9, lines 19-36, on a data page, fig 7a), in which, a record deviation is a position deviation of a record on the data page (i.e. the file (record) pointers specify an absolute physical address where the directory or file resides, column 9, lines 19-36, fig 7b), each directory in the directory structure is called dir_slot, and each dir_slot stores the position deviation of one record (i.e. the root directory structure stores pointers of the children directories, column 9, lines 19-36), and Searching for relative records in the dir_slot by adopting a locating algorithm (i.e. directories may be searched, column 5, lines 57-62, using subroutine SEARCH DIRECTORY, column 13, lines 62-63), after locating one certain dir_slot, slot, searching the relative group of records in order according to the record deviation stored in the dir_slot and locating the record to be searched for accuracy, and outputting the

deviation of the record (i.e. directory is searched, and directory entries (sub-directories and files) are searched, and a pointer to a matching file is returned, column 13, line 61-column 14, line 15).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Claims 2 – 6, and 11 – 13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Antoshenkov (US Patent 5379422) in view of Noven (US Patent 5884297).

With respect to claim 2, Antoshenkov teaches a directory structure, and how directories and records are arranged and accessed within that structure, column 1, line 66 - column 2, line 15). Antoshenkov does not explicitly disclose putting a record to be searched for in a field as claimed. However, Noven teaches claimed putting the record to be searched for into a field structure, and comparing the record on the data page with the field structure (i.e. a field is searched using the modified binary search algorithm, column 15, lines 6-12). Antoshenkov and Noven are analogous art because they are from the same field of endeavor of processing data structures using algorithms.

At the time of the invention, it would have been obvious to one of ordinary skill in the art to modify the system of Antoshenkov with the teachings of Noven in order to use binary search for look up requests (Noven, column 6, lines 1-5). The motivation for doing so would have been to use a search algorithm that will help to create efficient database search (Noven, column 5, lines 29-49).

With respect to claim 3, Antoshenkov teaches a directory structure, and how directories and records are arranged and accessed within that structure, column 1, line 66-column 2, and line 15). Antoshenkov does not explicitly disclose how the locating search operates. However, Noven teaches first endowing two variables low and up which represent the number of dir_slot with initial values, in which, low is endowed with a value of 0, up is endowed with a value that is a total number of dir_slot on the page, then searching by adopting locating algorithm, and judging which dir_slot the record belongs to (i.e. binary search is executed to find a record, and the variables FOUND

and POS correspond to low and up, because FOUND represents 0 initial values, and POS is equal to one half of the amount of data, column 23, lines 5-15).

At the time of the invention, it would have been obvious to one of ordinary skill in the art to modify the system of Antoshenkov with the teachings of Noven in order to use binary search for look up requests (Noven, column 6, lines 1-5). The motivation for doing so would have been to use a search algorithm that will help to create efficient database search (Noven, column 5, lines 29-49).

With respect to claim 4, Antoshenkov teaches a directory structure, and how directories and records are arranged and accessed within that structure, column 1, line 66-column 2, line 15). Antoshenkov does not explicitly disclose that the locating algorithm is a dichotomizing algorithm. However, Noven teaches locating algorithm is dichotomizing locating algorithm (i.e. look up algorithm is a dichotomizing, or binary search algorithm, column 15, lines 6-12).

Antoshenkov and Noven are analogous art because they are from the same field of endeavor of processing data structures using algorithms. At the time of the invention, it would have been obvious to one of ordinary skill in the art, having the teachings of Antoshenkov and Noven before him or her, to modify the system of Antoshenkov with the teachings of Noven in order to use binary search for look up requests, (Noven, column 6, lines 1-5). The motivation for doing so would have been to use a search algorithm that will help to create efficient database search (Noven, column 5, lines 29-49). Therefore, it would have been obvious to combine Noven with Antoshenkov to obtain the invention as specified in the instant claims.

With respect to claim 5, Antoshenkov teaches an algorithm is to take out a medial value continuously to compare with the field structure, until the value of up-low is not more than 1 (i.e. number greater than zero and less than one is multiplied by the number K, and incremented by 1 , column 12, lines 2-13).

With respect to claim 6, Antoshenkov teaches after finding the record dir_slot, selecting records orderly from the dir_slot with the number of low to compare with the field structure, till the record is the last record of the dir_slot next to this record is a up record up_rec of the dir_slot with the number of up (i.e. search is executed along a path, and keys are compared in order, after one has been examined, moving to the next key, column 13, line 61- column 14, line 5), if the record is found during this process, finishing the search on this page (i.e. search is continued and returned for the current directory, column 14, lines 1-3), if the record is not found, turning to the next page to perform the same match (i.e. if the key is not found, the remaining directory entries are searched, column 14, lines 4-6).

At the time of the invention, it would have been obvious to one of ordinary skill in the art to modify the system of Antoshenkov with the teachings of Noven in order to use binary search for look up requests (Noven, column 6, lines 1-5). The motivation for doing so would have been to use a search algorithm that will help to create efficient database search (Noven, column 5, lines 29-49).

With respect to claim 11, Antoshenkov teaches a directory structure, and how directories and records are arranged and accessed within that structure, column 1, line 66-column 2, line 15). Antoshenkov does not explicitly disclose that the locating

algorithm is a dichotomizing algorithm. However, Noven teaches locating algorithm is dichotomizing locating algorithm (i.e. look up algorithm is a dichotomizing, or binary search algorithm, column 15, lines 6-12).

At the time of the invention, it would have been obvious to one of ordinary skill in the art to modify the system of Antoshenkov with the teachings of Noven in order to use binary search for look up requests (Noven, column 6, lines 1-5). The motivation for doing so would have been to use a search algorithm that will help to create efficient database search (Noven, column 5, lines 29-49).

With respect to claim 12, Antoshenkov teaches a directory structure, and how directories and records are arranged and accessed within that structure, column 1, line 66-column 2, line 15). Antoshenkov does not explicitly disclose that the locating algorithm is a dichotomizing algorithm. However, Noven teaches locating algorithm is dichotomizing locating algorithm (i.e. look up algorithm is a dichotomizing, or binary search algorithm, column 15, lines 6-12).

At the time of the invention, it would have been obvious to one of ordinary skill in the art to modify the system of Antoshenkov with the teachings of Noven in order to use binary search for look up requests (Noven, column 6, lines 1-5). The motivation for doing so would have been to use a search algorithm that will help to create efficient database search (Noven, column 5, lines 29-49).

With respect to claim 13, Antoshenkov teaches after finding the record `dir_slot`, selecting records orderly from the `dir_slot` with the number of low to compare with the field structure, till the record is the last record of the `dir_slot` next to this record is a up

record up_rec of the dir_slot with the number of up (i.e. search is executed along a path, and keys are compared in order, after one has been examined, moving to the next key, column 13, line 61- column 14, line 5), if the record is found during this process, finishing the search on this page (i.e. search is continued and returned for the current directory, column 14, lines 1-3), if the record is not found, turning to the next page to perform the same match (i.e. if the key is not found, the remaining directory entries are searched, column 14, lines 4-6).

At the time of the invention, it would have been obvious to one of ordinary skill in the art to modify the system of Antoshenkov with the teachings of Noven in order to use binary search for look up requests (Noven, column 6, lines 1-5). The motivation for doing so would have been to use a search algorithm that will help to create efficient database search (Noven, column 5, lines 29-49).

Claims 7-10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Antoshenkov (US Patent 5379422) in view of Schmuck et al. (US Patent 5893086).

With respect to claim 7, Antoshenkov teaches a directory structure, and how directories and records are arranged and accessed within that structure, column 1, line 66-column 2, and line 15). Antoshenkov does not explicitly disclose dividing a record or directory in order to make room for a new record as claimed. However, Schmuck teaches claimed record number of dir_slot is full due to inserting of one record onto a data page in a database, splitting the current dir_slot into two ones, so as to increase a dir_slot (i.e. inserting a record in the directory may require splitting the directory in two to make room for the new record, column 6, lines 33-41). Antoshenkov and Schmuck

are analogous art because they are from the same field of endeavor of processing data structures using algorithms.

At the time of the invention, it would have been obvious to one of ordinary skill in the art to modify the system of Antoshenkov with the teachings of Schmuck in order to manipulate files and directories within the directory structure, (Schmuck, column 3, lines 51-56). The motivation for doing so would have been to use indexing and file access methods to speed up lookups (Schmuck, column 6, lines 21-32).

With respect to claim 8, Antoshenkov teaches a directory structure, and how directories and records are arranged and accessed within that structure, column 1, line 66-column 2, and line 15). Antoshenkov does not explicitly disclose dividing a record or directory in order to make room for a new record. However, Schmuck teaches if the total number of records on the dir_slot where the record locates exceeds a maximum value after inserting the record into a chain table, moving all of the dir_slots behind this dir_slot one bit backward, thus, increasing adding one dir_slot, and dividing all the records on the dir_slot where this record belongs to into two parts, and attaching these two parts of records to the two dir_slots respectively (i.e. if inserting a record in the directory causes the directory to be full, the directory may be split in two, and records may be moved to a different physical location, column 6, lines 33-41).

At the time of the invention, it would have been obvious to one of ordinary skill in the art to modify the system of Antoshenkov with the teachings of Schmuck in order to manipulate files and directories within the directory structure, (Schmuck, column 3, lines

51-56). The motivation for doing so would have been to use indexing and file access methods to speed up lookups (Schmuck, column 6, lines 21-32).

With respect to claim 9, Antoshenkov teaches a directory structure, and how directories and records are arranged and accessed within that structure, column 1, line 66-column 2, line 15). Antoshenkov does not explicitly disclose deleting a record as claimed. However, Schmuck teaches claimed deleting a record, taking it out from a chain table and setting a deleting mark to it (i.e. record is deleted, column 10, lines 55-64). Antoshenkov and Schmuck are analogous art because they are from the same field of endeavor of processing data structures using algorithms.

At the time of the invention, it would have been obvious to one of ordinary skill in the art to modify the system of Antoshenkov with the teachings of Schmuck in order to manipulate files and directories within the directory structure, (Schmuck, column 3, lines 51-56). The motivation for doing so would have been to use indexing and file access methods to speed up lookups (Schmuck, column 6, lines 21-32).

With respect to claim 10, Antoshenkov teaches a directory structure, and how directories and records are arranged and accessed within that structure, column 1, line 66-column 2, and line 15). Antoshenkov does not explicitly disclose merging directories. However, Schmuck teaches obtaining a dir_slot next to this dir_slot first, and judging the record number of the next dir_slot, if the record number exceeds a minimum value, taking out a record from the next dir_slot, and adding it to the current dir_slot (i.e. inserting a record in the directory may require splitting the directory in two to make room for the new record, column 6, lines 33-41), if the record number is less than or equal to

the minimum value, combining these two dir_slots, and deleting the current dir_slot (i.e. two directories are merged, and the current one is deleted, column 10, lines 27-30).

At the time of the invention, it would have been obvious to one of ordinary skill in the art to modify the system of Antoshenkov with the teachings of Schmuck in order to manipulate files and directories within the directory structure, (Schmuck, column 3, lines 51-56). The motivation for doing so would have been to use indexing and file access methods to speed up lookups (Schmuck, column 6, lines 21-32).

Conclusion/Contact Information

Any inquiry concerning this communication or earlier communications from the examiner should be directed to ALEXANDRIA Y. BROMELL whose telephone number is (571)270-3034. The examiner can normally be reached on M-F 8-4.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, John R. Cottingham can be reached on 571-272-7079. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Alexandria Y Bromell/
Examiner, Art Unit 2167
December 20, 2008

/S. A. A./
Primary Examiner, Art Unit 2162

/John R. Cottingham/
Supervisory Patent Examiner, Art Unit 2167